UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

June 16, 1999

MEMORANDUM

SUBJECT: Reregistration of **Tetrachlorvinphos**: Revised Anticipated Residue Estimates; PC Code No. : 83701; DP Barcode D256476

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HED has been asked to provide revised anticipated residue estimates for the organophosphate insecticide tetrachlorvinphos, since BEAD has updated the percent of animals treated (T. Kiely, 5/99). A revised risk assessment is due on June 16. Previous anticipated residue estimates have been prepared by HED (D. Miller; DP Barcodes D218602, D243528; 9/4/95, 9/16/95).

CONCLUSIONS AND RECOMMENDATIONS

A summary of residue levels and usage information to be used in acute, chronic, and cancer dietary risk assessments may be found in Table 1. Additional data which could be used to refine our dietary exposure estimates include more information on the relative amount of feed-through and dermal usage, reported separately, and actual magnitude of residue data (direct livestock treatment studies).

DETAILED CONSIDERATIONS

No magnitude of residue data are available reflecting current use rates, so previous anticipated residue and time-limited tolerance estimates are based on the nature of the residue studies. Previous memoranda have outlined assumptions made, some of which are repeated here for clarity, along with updated use/usage information.

- Product labels do not specifically prohibit using both the direct animal treatments and feed-through products at the same time. However, BEAD has consulted several state extension agents and consultants, who all have stated that both types of products would not be used at the same time on cattle and swine (M. Hennessey, personal communication, 5/28/99). Therefore the use pattern which results in the highest residues in any commodity were used to estimate the anticipated residues, instead of combining the residues from the feed-through and direct treatments.

- The direct animal treatment and feed-through applications are not registered for sheep and goats, but tetrachlorvinphos is labeled for use on agricultural premises. There are no restrictions for removing animals during premise treatment, but BEAD consultations with industry experts indicate that the general practice is to remove the animals.

- BEAD was unable to provide estimates of percent animals treated for sheep and goats. Therefore HED used the highest percent animals treated for any animal, which is horses at 31% (estimated maximum).

- Some product labels prohibit the use of tetrachlorvinphos feed-through products on horses intended for slaughter; others do not. Previous HED memoranda have recommended for not considering the feed-through use on horses for estimating the anticipated residues and required addition of the slaughter restriction to all labels. This assumption will be continued since the product labels for the registrant generating the data include this restriction. Only the potential exposure to horses from agricultural premise treatment will be considered.

- Since both proximal (loin muscle taken from directly beneath the application site) and distal (round muscle, located near the thigh of the animal) muscle samples were taken and showed significantly different tetrachlorvinphos residues, HED used a weighted average of these two muscle samples to estimate residue levels in the commodity "beef, lean": although somewhat arbitrary, HED estimated that no greater than 20% of the edible muscle mass would contain tetrachlorvinphos concentrations similar to those obtained from the loin muscle located directly beneath the application site. HED also estimated that no less that 80% of the muscle mass would contain concentrations similar to those found distally in the round muscle. From these assumptions, HED can refine the estimate of anticipated residues in the muscle (meat) of cattle, goats, and hogs for use in the dietary analysis.

- In a manner similar to that used for cattle and other ruminants (see above), HED estimated

the concentration of tetrachlorvinphos in poultry meat by averaging the concentrations found in breast muscle with that found in thigh muscle. From these assumptions, HED can refine the estimate of anticipated residues in the muscle (meat) of chicken, turkey, and other poultry for use in DEEM™.

- In those instances where no residues were detected in specific meat, milk, egg, and poultry commodities, HED estimated the residues as one-half the limit of detection.

- Only residues of tetrachlorvinphos are included in the estimates of cholinesterase-inhibiting metabolites as per the Metabolism Committee decision memo (J. Abbotts, 9/14/93).

Although refined, these anticipated residues are still believed to be conservative estimates of residue levels for the following reasons:

- For dermal treatment of ruminants, the registrant simulated worst-case application technique: the application site was prepared by clipping the hair from an 8 ½ x 11" area on the goat's back at the midline, a hand-held dryer was used to enhance drying and prevent run-off, the goat was restrained in a stanchion to protect the application site from excessive movement, and absorption was likely enhanced by splitting the daily treatment into two parts. In addition, the animal's entire dose was applied to this one rectangular area and the sampled loin muscle was located directly beneath this application area.

- The sampled loin muscle was taken from directly beneath the application area. HED assumed that the concentrations of tetrachlorvinphos residues detected in this sample would be representative of 20% of the muscle tissues (beef) in the animal. This is likely to be an overestimate.

- As with the dermal applications to ruminants, the registrant clipped down from the hen abdomens prior to application of the radiolabeled tetrachlorvinphos solution and dried the area with a hand-held dryer. These measures would also be expected to cause higher absorbed residues than would result from ordinary practices in the field.

- HED has not further refined the estimates to account for additional losses expected from cooking or baking, because data are not available describing the fate of tetrachlorvinphos residues when cooked.

Monitoring Data

USDA-FSIS analyzed fat samples for residues of tetrachlorvinphos *per se* during the years 1993-1997 (S. Hummel, 6/2/98). Three samples showed detectable residues of tetrachlorvinphos: a hog fat sample at 0.18 ppm, a dairy cow fat sample at 0.26 ppm, and a goat fat sample at 0.09

ppm. These data indicated there is a potential for detectable residues, but we are unable to use them for risk assessment since the commodity which is consumed in the greatest quantity, meat, was not analyzed.

USDA Pesticide Data Program (PDP) analyzed 570 milk samples in 1996 and 727 in 1997 for residues of tetrachlorvinphos *per se*. No residues were detected in any sample at detection limits of 0.001-0.005 ppm. These data are useful for indicating that the parent compound is not likely to be present in milk, but they cannot be used in the chronic and cancer risk assessment since samples were not analyzed for the metabolites. It is recommended that these data be used in the acute dietary assessment, since only tetrachlorvinphos is of concern.

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Table 1. Estimates of Tetrachlorvinphos Residues in Livestock Commodities [1]

Commodity	Time-Limited Tolerance, ppm	Estimate of Cholinesterase inhibiting metabolites only to be used in the Acute Analysis, ppm[2]	Total Estimated Residues, Parent plus Metabolites		Percent Animals Treated [3]		Anticipated Residue for Chronic and Cancer Risk Assessments, ppm [4]	Comments
			Residues from Feed-Through application, ppm	Residues from Dermal application, ppm	Wtd. Avg.	Est. Max		
Cattle meat	2	1.86 (loin) 0.001(round)	<0.01	1.87 (loin) 0.01(round)	1	2	0.00382	Assumes 20% loin and 80% round for meat AR; also assumes animals will not receive both oral and dermal treatments.
Cattle, Fat	0.2	0.06	0.06	0.10	1	2	0.001	
Cattle, liver	0.5	<0.01	0.38	0.01	1	2	0.0038	
Cattle, kidney	1	<0.01	0.50	0.13	1	2	0.005	
Eggs	0.2	0.03	N/A[5]	0.19	6	11	0.011	
Goats, meat	2	<0.01	N/A	0.01	16	31	0.0016	Only premise use, so dermal only considered. Not directly applied to animal, so used loin value for meat. Used percent animals treated for horses.
Goats, Fat	0.2	<0.01	N/A	0.10	16	31	0.016	
Goats, liver	0.5	<0.01	N/A	0.01	16	31	0.0016	
Goats, kidney	1	<0.01	N/A	0.13	16	31	0.0208	
Hogs, meat	2	1.86 (loin) 0.001(round)	<0.01	1.87	2	3	0.0374	Used higher of feed-through or dermal values for estimating anticipated residues.
Hogs, fat	0.2	0.06	0.06	0.10	2	3	0.002	
Hogs, liver	0.5	<0.01	0.38	0.01	2	3	0.0076	
Hogs, kidney	1	<0.01	0.5	0.13	2	3	0.01	

Commodity	Time-Limited Tolerance, ppm	Estimate of Cholinesterase inhibiting metabolites only to be used in the Acute Analysis, ppm[2]	Total Estimated Residues, Parent plus Metabolites		Percent Animals Treated [3]		Anticipated Residue for Chronic and Cancer Risk Assessments, ppm [4]	Comments
			Residues from Feed-Through application, ppm	Residues from Dermal application, ppm	Wtd. Avg.	Est. Max		
Horses, meat	2	<0.01	N/A	0.01	16	31	0.0016	Only premise use, so dermal only considered. Not directly applied to animal, so used round value for meat.
Horses, Fat	0.2	<0.01	N/A	0.10	16	31	0.016	
Horses, liver	0.5	<0.01	N/A	0.01	16	31	0.0016	
Horses, kidney	1	<0.01	N/A	0.13	16	31	0.0208	
Milk	0.05	0.0014	<0.01	0.02	0.3	0.6	0.00006	Acute value is equal to 1/2 the weighted average of the LODs from the PDP monitoring data
Poultry, meat	3	thigh - 2.32 breast - 0.37	N/A	thigh - 2.89 breast - 0.54	6	11	0.10	Meat value is an average of thigh and breast.
Poultry, fat	7	6.1	N/A	6.94	6	11	0.42	
Poultry, mbyp	2	<0.01	N/A	1.27	6	11	0.077	
Sheep, meat	2	<0.01	N/A	0.01	16	31	0.0016	Only premise use, so dermal only considered. Not directly applied to animal, so used round value for meat. Used percent animals treated for horses.
Sheep, fat	0.2	<0.01	N/A	0.10	16	31	0.016	
Sheep, liver	0.5	<0.01	N/A	0.01	16	31	0.0016	
Sheep, kidney	1	<0.01	N/A	0.13	16	31	0.0208	

1. Estimates are based on metabolism studies, and not on magnitude of residue studies.

2. Tetrachlorvinphos is the only cholinesterase-inhibiting residues of concern.

3. Percent Animals Treated obtained from BEAD Quantitative Usage Analysis dated 5/99, T. Kiely.

4. Calculated by multiplying the total estimated residue by the percent animals treated (weighted average).

5. N/A = Not applicable; there are no feed-through uses for poultry, sheep, and goats. A restriction is expected to preclude the feed-through use on horses intended for slaughter.